

WHAT IS CLAIMED IS:

- 2 1. A method of determining glucose concentration in a whole blood sample
comprising:
 - 4 providing an electrochemical sensor adapted to measure glucose and hematocrit
concentrations;
 - 6 measuring the hematocrit concentration of the whole blood sample using the
electrochemical sensor via electrochemical impedance spectroscopy;
 - 8 measuring the initial glucose concentration of the whole blood sample using the
electrochemical sensor; and
 - 10 calculating the unbiased glucose concentration in the whole blood sample using
the initial glucose concentration measurement and the hematocrit concentration.
- 12 2. The method of claim 1, wherein the glucose concentration of the whole
14 blood sample is determined using an amperometric monitoring system.
- 16 3. The method of claim 1, wherein the electrochemical sensor includes an
insulating base plate, an electrode system on the base plate and a cover adapted to mate
18 with the base plate to form a space in which the electrode layer is available to contact the
whole blood sample.
- 20 4. The method of claim 3 further including a reaction layer comprising an
22 enzyme that reacts with the glucose in the whole blood sample.
- 24 5. The method of claim 4, wherein the enzyme in the reaction layer is
combined with a hydrophilic polymer.
- 26 6. The method of claim 1, wherein the method of determining glucose
28 concentration in a whole blood sample occurs in disposable self-testing systems.

2 7. The method of claim 1, wherein the method of determining glucose
concentration in a whole blood sample occurs in a clinical analyzer.

4 8. The method of claim 1, wherein the measuring of the hematocrit
concentration in the whole blood sample is performed before measuring the initial
6 glucose concentration.

8 9. The method of claim 1, wherein the measuring of the hematocrit
concentration of the whole blood sample is performed using a single frequency
10 measurement.

12 10. The method of claim 1, wherein the measuring of the hematocrit
concentration of the whole blood sample is performed using a plurality of frequency
14 measurements.

16 11. The method of claim 1, wherein the measuring of the hematocrit
concentration is performed using a phase shift of an impedance measurement.

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20 12. The method of claim 11, wherein the measuring of the hematocrit
concentration is performed with at least one frequency between about 800 and about 900
Hz.

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24 13. The method of claim 1, wherein the measuring of the hematocrit
concentration is performed using magnitude components of an impedance measurement.

26 14. The method of claim 13, wherein the measuring of the hematocrit is
performed with at least one frequency between about 300 and about 10,000 Hz.

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30 15. The method of claim 1 further including applying AC waveforms from
about 1 to about 10,000 Hz to the electrochemical sensor.

2 16. The method of claim 1 further including applying AC waveforms from
about 1 to about 100mV to the electrochemical sensor.

4 17. The method of claim 1 further applying AC waveforms that are
6 subsequently deconvoluted using a Fourier transform.

8 18. A method of determining glucose concentration in a whole blood sample
comprising:

10 providing an electrochemical sensor adapted to measure glucose and hematocrit
concentrations;

12 measuring the hematocrit concentration of the whole blood sample using the
electrochemical sensor via electrochemical impedance spectroscopy using an
14 amperometric monitoring system;

 measuring the initial glucose concentration of the whole blood sample using the
16 electrochemical sensor; and

 calculating the unbiased glucose concentration in the whole blood sample using
18 the initial glucose concentration measurement and the hematocrit concentration.

20 19. The method of claim 18, wherein the method of determining glucose
concentration in a whole blood sample occurs in disposable self-testing systems.

22 20. The method of claim 19, wherein the measuring of the hematocrit
24 concentration of the whole blood sample is performed using a single frequency
measurement.

26 21. The method of claim 19, wherein the measuring of the hematocrit
28 concentration of the whole blood sample is performed using a plurality of frequency
measurements.

22. The method of claim 19, wherein the measuring of the hematocrit
2 concentration is performed using a phase shift of an impedance measurement.

4 23. The method of claim 22, wherein the measuring of the hematocrit
concentration is performed with at least one frequency between about 800 and about 900
6 Hz.

8 24. The method of claim 19, wherein the measuring of the hematocrit
concentration is performed using magnitude components of an impedance measurement.

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25. The method of claim 24, wherein the measuring of the hematocrit is
12 performed with at least one frequency between about 300 and about 10,000 Hz.

14 26. The method of claim 19 further including applying AC waveforms from
about 1 to about 10,000 Hz to the electrochemical sensor.

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27. The method of claim 19 further including applying AC waveforms from
18 about 1 to about 100mV to the electrochemical sensor.

20 28. The method of claim 19 further applying AC waveforms that are
subsequently deconvoluted using a Fourier transform.